EXHIBIT C

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF WEST VIRGINIA
AT CHARLESTON

IN RE: ETHICON, INC., PELVIC REPAIR SYSTEM PRODUCTS LIABILITY LITIGATION **THIS DOCUMENT RELATES TO WAVE 1**	**Master File No. 2:12-MD-02327** **JOSEPH R. GOODWIN** **U.S. DISTRICT JUDGE**

RULE 26 EXPERT REPORT OF BRIAN RAYBON, M.D.
PROLIFT

The following report is provided pursuant to Rule 26 of the Federal Rules of Civil Procedure.

QUALIFICATIONS

I am Board Certified in both Ob/Gyn and Female Pelvic Medicine and Reconstructive Surgery. I obtained a BA in Chemistry and a BS in Chemical Engineering from North Carolina State University. I attended medical school at the University of North Carolina and then did a four year residency in Gynecology and Obstetrics at Emory University. After completing my residency, I spent a year overseas participating in visiting fellowships in different countries where the focus was on both pelvic surgery and gynecologic oncology. Upon returning to the United States, I completed a fellowship in Pelvic Surgery at the Institute for Special Pelvic Surgery in Baltimore, Maryland. Since then, I have been in private practice in North Georgia. Most recently, I am participating as a Core Faculty Member helping to develop a residency program at Athens Regional Medical Center in Athens, Georgia. This program will be the first new residency program in Georgia in over two decades. In addition, last year I was appointed

Clinical Assistant Professor at the Medical College of Georgia. My CV is attached as Exhibit "A".

Since the early 2000s I have been a consultant, preceptor and proctor for various companies including: CR Bard, American Medical Systems, Coloplast and Medtronic. I had an extensive relationship with CR Bard where I was involved in the early developmental stages of the Avaulta prolapse mesh product lines, as well as the Align and Ajust urethral slings.

I implanted over 300 of the Avaulta POP mesh kits, which are similar in design and implantation method to Gynecare"s Prolift devices. I have also evaluated and used other pelvic mesh devices. I implanted over 25 Prolift products. I stopped using the Prolift products in 2008 due to an unacceptably high erosion rate and personal knowledge of the fact that Gynecare did not exercise due diligence in insuring that implanting physicians were adequately trained. In the years since, I removed over 75 of the Prolift products.

Based upon my work as an urogynecologist and pelvic floor surgeon, I am familiar with the medical complications that are generally associated with mesh repair surgery, and I am experienced in the recognition, diagnosis, and treatment of patients suffering from complications caused by pelvic mesh implants. The most common mesh related complications include pelvic pain, scarring in the vagina and pelvic floor, pain into the legs and thighs, dyspareunia, chronic inflammation, scar bands or scar plates in the vagina, vaginal shortening or stenosis, erosion of mesh into tissues or organs, and nerve damage.

OPINIONS

All of my opinions in this report I hold to a reasonable degree of medical certainty.

A. Ethicon ignored governmental requirements in bringing the Prolift to market, and ultimately withdrew the product from the market.

Ethicon marketed its Prolift mesh devices without first obtaining FDA 510(k) clearance, and sold the product for more than three years in the United States without governmental permission. When the FDA ultimately evaluated the safety and efficacy of mesh pelvic organ prolapse repair kits in 2011, and determined that the safety and efficacy of those products had not been established, Ethicon withdrew the Prolift from the market rather than conducting the clinical trials. As Ethicon"s documents and studies show, the Prolift was neither safe nor effective.

B. The Prolift is defectively designed.

I have worked with medical device manufacturers in the development and evaluation of pelvic repair mesh products. In designing a pelvic repair mesh product intended to be sold and implanted by physicians like myself, a reasonable device manufacturer must consider and weigh all of the known risks versus the benefits of a particular design, as well as all information known to the manufacturer that may bear on the safety and efficacy of the design, including the gravity, severity, likelihood, and avoidability of the dangers associated with the design.

As Ethicon itself recognized, before the Prolift product was ever marketed, pelvic organ prolapse is a functional disorder and is not life threatening. Therefore, its treatment must not create serious complications.[1] However, the Prolift did have the potential to cause serious and potentially life-altering complications. At about the same time the Prolift was first sold in the U.S., Ethicon"s internal documents reflect that consulting physicians were concerned that the

efficacy of the product had not been demonstrated by any data and that the risks associated with the product were serious.[2]

Ethicon-sponsored clinical studies conducted on the mesh component of the Prolift failed Ethicon"s own internal criteria for efficacy (successful prolapse treatment), and showed high rates of serious complications caused by the product,[3] demonstrating an unacceptable risk/benefit profile for the Prolift.

The risks inherent in the design of the Prolift outweigh its benefits for several reasons, including but not limited to:

1. The Gynecare Prolift systems require transvaginal implantation of a synthetic polypropylene mesh using specially designed trocars (needles) and sleeves. These products are comprised of a main mesh area and arms which act as fixation points to anchor the mesh arms in the obturator internus, levator ani muscles, and/or the sacrospinous-coccygeus complexes bilaterally. The Prolift products consist of a central portion with arms for anchoring the mesh in the pelvic sidewall, and were sold as separate systems intended for the independent treatment of anterior and posterior prolapse. The Total Prolift is a single piece of precut mesh, consisting of contiguous anterior and posterior central portions, with 6 arms for anchoring the mesh in the pelvic sidewalls (4 arms for the anterior portion, and 2 arms for the posterior portion). The arms are passed through the sacrocpinous-coccygeus complex proximally and through the obturator foramen, near the junction of the superior and inferior pubic rami, distally. The products are implanted by blindly passing trocars inward through the perineal skin, obturator foramen, obturator internus, levator ani or sacrospinous-coccygeus complex, out through a mid-vaginal incision, then withdrawing the trocars and leaving the plastic sleeves in place. A noose is then passed through each sleeve, and brought into the midvaginal incision. Then, the mesh arms are

placed into the loop of each noose, which is then pulled to bring each mesh arm outward into place, thereby anchoring the mid portion of the mesh either between the bladder and anterior vaginal wall (anterior Prolift), or between the rectum and the posterior vaginal wall (posterior Prolift). As the Prolift mesh arms are being pulled through the plastic sleeves, they conform to the shape of the small bore cylindrical sleeves, which causes deformation and curling of the arms, altering the shape of the arms at the point of contact with the pelvic sidewall. The arms are composed of synthetic polypropylene mesh, and they are intended to scar into place at the muscle attachment points for each arm. For the Prolift products, there will be arms in the left pelvic sidewall muscles (the sacrospinous-coccygeus complex proximally, and the obturator internus and levator ani distally) and in the right pelvic sidewall muscles. In this way, the main body of the Prolift mesh is intended to support the anterior and posterior walls of the vagina, to correct anterior and/or posterior prolapse, respectively. The Total Prolift product consists of integrated anterior and posterior components, each with arms on left and right side, and this means there will be 3 mesh arms anchored on the right side, and 3 anchored on the left. Polypropylene mesh is known to cause tissue contraction (referred to as mesh shrinkage). When the mesh shrinks, the arms of the mesh pull on their anchoring points in the pelvic sidewall muscles (obturator and levator ani), tending to pull these anchoring points and the attached muscle toward the midline. It is my opinion that, in women with these Prolift transvaginal mesh implants, this pulling on the pelvic sidewall muscles causes pain at rest, during sexual intercourse, during defecation, and during normal daily activities like coughing, jumping, and straining. These arms along with the scar plate that can occur around the body of the mesh turns the vagina into an immobile organ which it is designed to be anything but. Attempts at defecation or sexual penetration will push on the mesh, aggravating the pulling on the arms as

stool attempts to come out of the rectum, or as the penis is placed into the vagina during intercourse. This aggravated pulling will cause new or worsening pain to the women in whom the product is implanted. Furthermore, this "side –to-side" surgical approach attempts to address apical (upper end of the vagina) prolapse that may be present by anchoring the mesh arms bilaterally through the sacrospinous-coccygeus complex. However, this bilateral anchoring creates a nonexpandable "spanning" bridge over the rectum which has the potential to obstruct stool passage and cause pain. I have seen several patients present "acutely" with this problem and treated initially for a bowel obstruction, and then I was consulted for management of this "distal" obstruction. During coughing, jumping, or straining, pressure is placed on the mesh, which is transmitted to the attachments in the pelvic sidewall, also deforming and pulling on the muscle at the attachment points.

The mechanical stresses imposed by the side to side attachment via the arms in combination with the shrinkage by the mesh cause patients pain. Scar plate formation also causes pain. I have surgically removed transvaginally placed meshes from women who had complications related to previously placed Prolift transvaginal meshes. I have personally observed shrunken, scarred explanted tissue and deformed Prolift mesh remnants as I have attempted to surgically remove the products. Sometimes the scarring and retraction is so severe that the mesh forms a crumpled ball.

The vagina is not a static organ. It functions as a support device; it stretches to accommodate varied functions such as childbirth, intercourse, defecation and urination. The mesh is static and does not "give" according to the needs of the tissues in which it is implanted. Additionally, the fibrotic shrinkage further restricts the functional mobility of the pelvic floor

organs and restricts the natural movements of the vagina during defecation, urination, and intercourse. These conditions cause pain.

2. The polypropylene material used in the manufacture of the mesh used in the Prolift devices was known to cause an intense and chronic foreign body reaction and inflammation, was prone to shrinkage, and was known to be subject to degradation inside the body.[4] Published medical and scientific literature available to Ethicon revealed that the mesh was not inert and was subject to degradation inside the body, and that this degradation has adverse medical consequences.[5] It is my belief that this degradation is an ongoing process that can cause clinical issues years down the road remote from the initial implantation.

3. The size of the pores in the mesh used in the Prolift devices was inadequate to allow good tissue ingrowth, and this resulted in excessive fibrotic bridging, scarification, and mesh contraction, which can cause erosion, vaginal or pelvic floor deformation, nerve damage, and chronic or permanent pain.

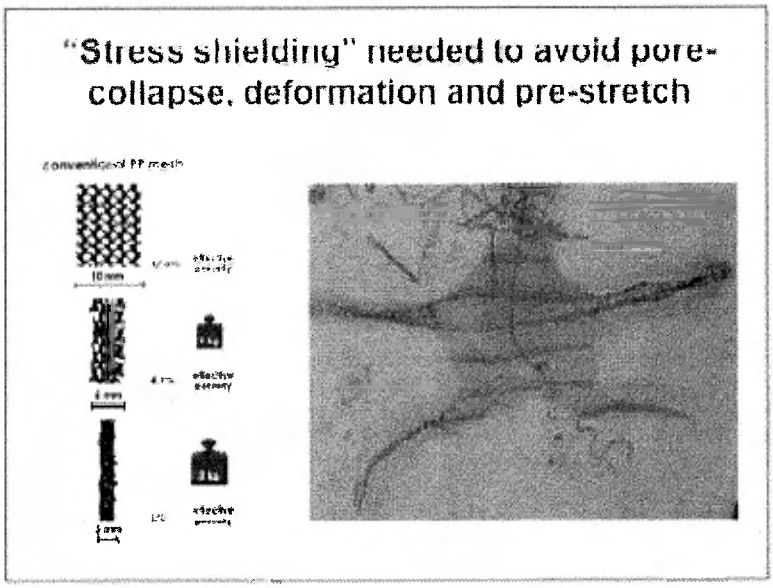
4. The mesh used in the Prolift devices was not specifically designed or determined to be safe for use in the female pelvis, and there was a serious biomechanical mismatch between the mesh and tissues in the vaginal area, the properties of which were never determined (and apparently never considered) before the Prolift was sold, as pointed out in paragraph 8 below.[6] A study involving vaginal implantation of three types of mesh in rhesus macaques showed that Gynemesh PS, the mesh used in the Prolift devices, "had the greatest negative impact on vaginal histomorphology and composition," and tissue injury "was highest with Gynemesh PS."[7] This study reports that "[o]ur results showed that following implantation with the stiffer mesh, Gynemesh PS, the vagina demonstrated evidence of a maladaptive remodeling response.... These findings are consistent with our previous study which showed that the tissue mechanical

properties of the underlying and associated grafted vagina deteriorated following implantation with the stiffer mesh Gynemesh PS but not the lower stiffness meshes [in the study]. The cause for the tissue degeneration was found to be in large part related to mesh stiffness. In a previous study, we showed that the stiffness of a mesh is intrinsically related to its weight, pore size and porosity. Thus, it is likely that under physiologic loading conditions, a heavier weight, less porous, stiffer mesh will have a more negative impact on the underlying and newly incorporated vagina due to a maladaptive remodeling response induced in part by stress-shielding."

5. The mesh arms of the Prolift were placed through a rounded cannula trocar tunnel that are smaller than the width of the mesh, through tissue, and exit the body through surgical wounds in the skin. The mesh arms can damage the tissue, exacerbate inflammation, and cause pain. The trocar-based insertion of mesh arms causes the arms to deform, fold, curl and/or roll, which causes or contributes to the excessive scarification and contraction of the arms. These mesh arms also deform (cord, rope) upon implantation and after implantation when forces are exerted on the central portion of the mesh and pull on the arms. I have never removed Prolift mesh arms that were not severely deformed. Gynecare"s Prolift implantation DVD show this stringing effect on the mesh arms in both the anterior (Lucente surgery) and posterior (Sepulveda surgery) Prolift devices. The deformation of the mesh arms impedes the body"s ability to incorporate into the material, and contributes to the excessive fibrotic reaction, scarification and shrinkage and pain.

Ethicon"s intemal documents reflect that Ethicon conducted a cadaver lab (or labs) in 2006 that demonstrated that the Prolift mesh arms deform (or "crumple") upon implantation,[8] and had visual/photographic evidence that was included in internal research and design documents that demonstrated this phenomenon.

ETH.MESH.02227282 (11/14/09 internal PowerPoint), Slide 6 – Photograph of explanted Prolift mesh showing deformation of arms:



6. As the Prolift mesh scars in, the resulting shrinkage or contracture of the tissues surrounding the mesh can entrap nerves, deform the vagina and pelvic anatomy, and result in severe, permanent and difficult-to-treat or untreatable pain as a result of the chronic inflammatory response and fibrosis.[9]

7. The blind passage of the metal trocars during implantation is unreasonably dangerous and presents the unnecessary risk of tissue damage, vascular damage, nerve damage, and internal trauma in the hands of many gynecological and urological surgeons.[10] While this risk can be ameliorated in the hands of an experienced surgeon with an in-depth knowledge of female pelvic anatomy, too often this was not the surgeon Ethicon chose to work with. I have firsthand knowledge of this happening. After I had performed several Prolift procedures, I was visited by the Ethicon representative and his regional manager. I personally asked the regional manager: "who are you going to push this product to?…what will be their qualifications?.." I was assured that only the most qualified surgeons would be used, and then, and only then, if we

demonstrated the ongoing safety of the product, would they allow other surgeons to be trained and perhaps perform the procedure. To my dismay, less than a week later, a surgeon at my hospital performed a Prolift procedure having never been to training and with just the representative to talk him through it.

8. The pelvic floor needs to be supple and flexible to perform its many functions, and to accommodate movement and forces associated with activities of daily living. However, polypropylene mesh placed transvaginally is stiffer and less flexible than the native tissues in the vagina. Scar plate formation and mesh stiffness are also incompatible with the natural functioning of the vagina. Literature on hernia mesh has reported that mesh can cause "considerable restriction of abdominal wall mobility" and "rigidity and discomfort, especially at the edge of the mesh, are frequently reported complaints."[11] Since it was known from published literature that mesh can be or become rigid and restrictive, Ethicon should not have used this material in the vagina, which has much greater sensitivity and requires far greater flexibility than the abdomen. The fibrotic scar that encapsulates the mesh used in the Prolift due to the defective design features previously described causes even greater rigidity, less flexibility, and pain. This scarring begins with the large curved trocars that are used.

In March 2010, Ethicon decided that a product in development, T-Pro, would "no longer have the Prolift instruments and procedure" and that "the shape of the graft has to change for obvious reasons, i.e., a new trocar-less delivery system and new procedure…" In response, Ethicon"s Worldwide Marketing Director admitted that "T-Pro is the first ever PFR graft designed for pelvic surgery…First time a graft has been designed to match the dynamic of the vagina especially site specific flexibility….First time a graft has been designed to match the

requirements of wound healing especially resistance to wound contracture." (HMESH_ETH_02328102-4) (See also footnote 14).

9. The Prolift is implanted through a transvaginal approach, which means the mesh goes through the vagina. Large amounts of bacteria are present in the vagina and can attach to the mesh, where the bacteria can proliferate, and result in abscesses, fistulae, infection, and chronic or permanent inflammation.[12]

10. Removing the Prolift mesh after it has been implanted is difficult and traumatic to the patient. It is very difficult and sometimes impossible to remove all of an armed transvaginal mesh implant like the Prolift. There is no evidence that Ethicon ever considered what should be done if the mesh caused complications and the mesh needed to be removed, or how to remove the product.

Surgery to attempt to remove the mesh increases the presence of scar tissue, which can create or contribute to the patient"s pelvic pain, dyspareunia and deformation and abnormal function of the pelvic area. Because the mesh often cannot be fully removed, patients who have experienced complications continue to suffer complications, including pain, even after undergoing revision or removal surgery. I have seen multiple patients where a Prolift mesh revision or removal was performed and clinical improvement occurred yet the patient was back years later for more surgery due to a recurrence of complications. This recurrence is depressing to many patients who begin to feel there is no hope for them to be pain free.

C. Ethicon failed to adequately warn physicians and patients about known problems with the Prolift.

I have reviewed and am familiar with the Instructions for Use, Physician Training materials, and sales and marketing materials generated by Ethicon for the Prolift. I have also reviewed the IFUs for many other medical products that I have implanted and explanted in

patients during the many years I have been practicing urogynecology and pelvic reconstructive surgery.

The IFU is a document which physicians reasonably rely upon to make informed decisions about whether and how to use a medical device. The contents of the IFU should assist the physician in an analysis that is employed when determining whether to recommend a particular product as a surgical option to a patient. I have read the IFUs for the Prolift products.

In order to make an informed decision as to whether to use a particular product in a given patient, a reasonable physician would expect a medical device company to provide relevant information known to the company that could impact the physician"s decision to use that product. Failure of the company to provide relevant information in its possession bearing on the potential safety of a product prevents physicians from making an intelligent decision regarding whether to implant the product. It also prevents physicians from properly counseling patients in considering whether to consent to surgery for permanent implantation of the medical device.

In making an informed decision of whether or not to use a medical implant, the physician must be warned not only of the potential adverse events that may be associated with the product, but also their frequency, severity and potential duration. Providing informed consent to my patients is a responsibility I take very seriously, as do most physicians. If a medical device company knows that the specific design of its product causes or increases the risk of a complication, the manufacturer is, in effect, minimizing the risk by misinforming doctors that the risks associated with the product "are those typically associated with surgically implantable materials," as stated in the IFU for the Prolift. If a manufacturer knows that a complication can be chronic, severe or permanent, it should provide that information to those using its products.

In my opinion, several statements in the "Description" and "Performance" sections of the IFU are false. For example, the IFU states that the material used in the mesh is "nonreactive" and that "[a]nimal studies show that implantation of Gynecare Gynemesh PS mesh elicits a minimum to slight inflammatory reaction, which is transient…" Contrary to these statements, however, Ethicon's internal documents reflect that the polypropylene material used in the Gynemesh PS was known to cause an "excessive" and "chronic" foreign body reaction and "intense" and "chronic" inflammation.[13]

Statements in the IFU that the material will "retain its strength indefinitely in clinical use," that the "mesh has excellent strength," and that "[t]he [Gynemesh PS] remains soft and pliable and wound healing is not noticeably impaired" are also contrary to Ethicon's internal documents, which show the material was known to be stiff and inflexible, was "over-engineered," too strong for the pelvis, and was not designed for the pelvic floor.[14]

The IFU's guarantee that "[t]he material [in the Gynemesh] is not … subject to degradation or weakening by the action of tissue enzymes" is also contradicted by Ethicon's internal documents reflecting that the material was subject to degradation inside the body.[15]

The Patient Information Brochure for Prolift touted that "[Prolift] allows for the restoration of sexual function by restoring vaginal anatomy," which was contrary to its own internal documents.[16]

The IFU statement that "[t]he bi-directional elastic property [of the mesh] allows adaptation to various stresses encountered in the body," was also false and lacked a factual basis. Ethicon never conducted any testing or studies to determine the stresses encountered in the female pelvis. Also, as discussed above, Ethicon's internal documents demonstrated that the

mesh was "over-engineered," and was too stiff and inelastic for compatibility in the female pelvis.

Ethicon failed to warn physicians and patients about known risks associated with the Prolift, and failed to properly warn of the frequency, severity and duration of the risks that were disclosed. In my opinion, the omission of instructions and warnings set forth below rendered the Prolift not reasonably safe.

1. Neither surgeons using the Prolift nor patients implanted with Prolift, between the date of launch and May 2008, were warned that the product was being sold without FDA approval and clearance.

2. Ethicon did not warn that the polypropylene used in the Gynemesh PS mesh used in the Prolift device caused intense, chronic and excessive inflammation and foreign body reaction, and was susceptible to degradation.

3. The minimum pore size of mesh must be 1 mm or larger in order to promote tissue ingrowth and reduce scar plate formation and "mesh shrinkage."[17]
Many of the pores in the Gynemesh PS mesh were much less than 1 mm, yet Ethicon never warned patients or doctors about the increased risks associated with the smaller Prolift mesh pores. Ethicon represented in its Prolift IFU that Gynemesh PS had "sufficient porosity for necessary tissue ingrowth" and in its marketing materials that Gynemesh PS had "Large pore size [which] fosters tissue incorporation,"[18] but Ethicon"s intemal documents show that the majority of measured pores in the Gynemesh PS mesh were significantly smaller than the 1 mm pore size recognized in scientific literature and Ethicon"s own documents as the minimum necessary for appropriate tissue response.[19] Ethicon never warned doctors that the pore size of the Gynemesh PS will decrease when under load.[20]

4. Despite information from one of the developers of the Prolift device that patients suffering from Grade IV prolapse or worse were "better suited" for Prolift than those with less severe prolapse, Ethicon never provided any such warning or information to doctors or any limitation on the use of the Prolift relative to the grade or severity of prolapse.[21] I am aware of cases where the prolapse was so small that only half the Prolift (i.e., only one set of arms) was used during the surgery.

5. Ethicon"s internal documents reflect that contraction/shrinkage associated with its mesh products was as high as 20% to 40% (or higher), and that this contracture was associated with deformation of the mesh which can cause pain. Indeed, an internal Ethicon presentation noted that some of the "[i]ssues with polypropylene mesh" are "Scar Plate Formation," "Stiffness," and "„Shrinkage 20-40%." No warning was ever provided about the frequency or severity of this increased risk.[22] My own experience in this regard was one of the reasons I ceased using Prolift.

6. From 2005 and 2009, Ethicon"s IFU failed to warn doctors of dyspareunia and painful mesh shrinkage associated with the Prolift or that Prolift can cause pain that is chronic or permanent.

The IFU was amended in 2009 to add an additional reference to "pelvic pain or pain with intercourse," but again contained limiting language that these complications "are those typically associated with pelvic organ prolapse repair procedures." Ethicon"s internal documents reflect that the pain experienced by Prolift patients was specifically associated with the Gynemesh PS mesh, and thus is fundamentally different from the types of pain that may be "associated with pelvic organ prolapse repair procedures."

7. Ethicon"s European Medical Director, Axel Arnaud, urged Ethicon in 2005 to include the following warning in the Prolift IFU: "WARNING: Early clinical experience has shown that the use of mesh through a vaginal approach can occasionally/ uncommonly lead to complications such as vaginal erosion and retraction which can result in anatomical distortion of the vaginal cavity that can interfere with sexual intercourse. Clinical data suggest the risk of such a complication is increased in case of associated hysterectomy. This must be taken in consideration when the procedure is planned in a sexually active woman." No such warning ever appeared in a Prolift IFU, and no warning regarding possible anatomical vaginal distortion, increased risk in hysterectomy patients, and avoidance of use in sexually active women was ever provided by Ethicon to doctors or patients.

8. Physicians and patients were never warned that a clinical study conducted on the Prolift device in 2005 by the physicians who participated in the Prolift"s development demonstrated that 19.6% of patients in the study suffered "painful mesh shrinkage."[23] Ethicon never conveyed any warning related to "painful mesh shrinkage."

9. Before October 1, 2009, Ethicon failed to warn physicians that a clinical study using transvaginally-implanted Gynemesh PS conducted in Europe by the physicians who helped develop the Prolift (which was intended to provide support for the Prolift product) failed the company"s own criteria for success (defined as a prolapse recurrence rate of less than 20%).[24] A revised IFU for Prolift released October 1, 2009 vaguely addressed the study"s failure in the "Clinical Performance" Section, by stating: "met pre-defined criteria of upper limit of 90% CI less than 20%...no."[25] This vague reference did not adequately convey to doctors that this clinical study failed Ethicon"s own criteria for successful prolapse treatment. Furthermore, even

though this adverse clinical study information was available to Ethicon in at least as early as June 2006, there was no mention in the IFU of this study until October, 2009.

Ethicon failed to warn physicians that the clinical study showed a 75.6% adverse event rate, a serious adverse event rate of 25.6%, a 10% "severe" adverse event rate, a 50% rate of adverse event requiring treatment, and a mesh-related adverse event rate of 66.7%.[26]

10. Ethicon's Medical Director, Dr. Hinoul, urged the company in 2008 to "Inform! Mesh is permanent. Some complications may require additional surgery that may or may not correct the complication. Potential for serious complications and their effect on quality of life: pain during intercourse, scarring, narrowing of the vaginal wall."[27] Ethicon never conveyed any such warning to doctors or patients to advise of these risks.

11. Before October 2009, Ethicon never provided any warning to address risks of nerve damage caused by Prolift mesh.[28] In a change to the Prolift IFU released in October 2009, Ethicon generically listed "nerve damage," but prefaced the warning with the limiting language that "Potential adverse reactions are those typically associated with surgery employing implantable materials of this type…." This incomplete warning gave no indication to doctors or patients that the mesh itself can damage, entrap, tether or sever nerves, and that this nerve damage can be difficult to treat and may be permanent.

12. Ethicon failed to warn physicians or patients of the danger of tissue tearing as the arms were being implanted.[29]

13. Ethicon did not warn physicians or patients that the mesh arms on the Prolift would deform during and after implantation instead of laying flat. The roping of the arms can cause or exacerbate pain by resulting in painful mesh arm "banding".[30] Ethicon's Medical

Director acknowledged that, other than a generic reference to "pain," the specific risks of painful shrinkage, scarification and contraction of the mesh arms were not included in any warning.[31]

14. Ethicon failed to adequately warn that the use of trocars inserted blindly through and into muscle and other tissue created the risks of tissue and nerve injury and potentially permanent nerve damage and pain.

15. Prior to October 1, 2009, the IFU failed to provide any warning of the risks of voiding dysfunction, de novo incontinence, urinary tract infection or urinary obstruction or retention, following Prolift implantation.[32]

16. To remove all or parts of the Prolift mesh requires invasive and difficult surgery. Ethicon failed to warn about this risk, and failed to provide any instruction or direction as to how to address complications, or what to do in the event mesh removal was necessary.

Having read and relied upon IFUs for surgical implants for a number of years, it is my opinion that the type of information detailed above should have been communicated to surgeons so that they could make safe treatment choices for their patients. Ethicon changed or updated the IFUs for the Prolift but never provided the information set forth above.

A medical device company which believes that its products may not be safely used in any segment of its patient population must make reasonable efforts to warn and instruct its consumers regarding a restriction for those patients. According to the Prolift IFU, the only restricted patient populations for the Prolift were infants, children, women who are pregnant or may become pregnant, or who may have infection or cancer. There was no restriction on the use of the Prolift device in other patients, such as smokers, diabetics, steroid users, fibromyalgia patients or patients with pre-existing pelvic pain. If Ethicon knew or believed that there may be risks specifically associated with the use of its Prolift product in a particular subset of patients, it

was obligated to so advise surgeons. Basically, by not providing this information , Ethicon robbed each surgeon of the opportunity to provide true informed consent.

D. Clinical Trials Demonstrated to Ethicon That Functional Outcomes Are Not Superior With Transvaginally Placed Armed Mesh (TVM)

I have participated in clinical trials.

When the definition of successful prolapse repair surgery includes both anatomic and functional outcomes, it is now clear that the risk of TVM surgery is greater than the benefit. "Transvaginal mesh has a higher re-operation rate than native tissue repair" due to the rate of surgeries for attempted repair of complications.[33]

It is also clear that there is no functional or anatomic benefit for TVM in the posterior compartment.[34] TVM may offer improved anatomical outcomes for polypropylene mesh compared with anterior colporrhaphy. However, these outcomes do not translate into improved functional outcomes or a lower reoperation rate for prolapse. The mesh group is also associated with increased morbidity, mesh extrusion, and higher reoperation rates.[35]

In a double-blind randomized trial comparing vaginal prolapse repair with and without mesh, there was no difference in anatomic benefit at three years; and there was a 15% mesh exposure rate after three months.[36]

Indeed, as previously mentioned (also see footnote 3), an Ethicon sponsored clinical study failed the company"s own stated criteria of success (defined as a prolapse recurrence rate of less than 20%),[37] and resulted in a 75.6% adverse event rate, a "serious" adverse event rate of 25.6%, a 10% "severe" adverse event rate, a 50% rate of adverse event requiring treatment, and a mesh-related adverse event rate of 66.7%.[38] At a minimum, this information should have been clearly and completely conveyed to physicians so that they could assess this information for themselves and with their patients. Not only did Ethicon not take any corrective action based on

the results of this study, it indicated its intent to "differentiate" the study results,[39] and failed to adequately provide any warning or information to physicians about the results of this study.

A nearly identical study was conducted during the same time frame in the United States, and it also demonstrated significant complication rates.[40] While the U.S. study was reported to have satisfied Ethicon"s criteria for "success," it nonetheless showed that 65.9% of patients suffered at least one adverse event, and that 44.7% of patients suffered an adverse event that was either device-related or procedure-related. It is also noteworthy that the failure rate at 12 months was 12% with a 90% confidence interval of 6.7-19.6%. Success for the study was arbitrarily defined as the upper 90% two-tailed confidence interval not exceeding 20%, which would signify a prolapse recurrence rate of less than 20%. Although in general the study met Ethicon"s internal criteria for "success",[41] the study report further analyzed the internal "success" rates for three separate groups of patients: anterior repair only; posterior repair only; and both anterior/posterior repair.[42] For both the anterior repair group and anterior/posterior repair group, the study results failed to satisfy Ethicon"s own internal criteria for "success."[43] Particularly in light of the results of the French study, surgeons should have been warned about the overall complication rates and that the device was a failure for two of the three groups of U.S. patients under Ethicon"s own criteria.

In a 2005-2006 Prolift clinical study conducted by the same European physicians who participated in the development of Prolift and who conducted the earlier Gynemesh PS study, 14% of patients suffered mesh exposure, 19.6% suffered "painful mesh shrinkage," and there was a failure rate of 24.3% at 18-months follow-up.[44] These results further demonstrated that the risks of this product outweighed any potential benefit.

A peer-reviewed, published study involving vaginal implantation of three mesh types in monkeys determined that Gynemesh PS "had the greatest negative impact on vaginal histomorphology and composition," and tissue injury "was highest with Gynemesh PS."[45] This study reports that "[o]ur results showed that following implantation with the stiffer mesh, Gynemesh PS, the vagina demonstrated evidence of a maladaptive remodeling response.... These findings are consistent with our previous study which showed that the tissue mechanical properties of the underlying and associated grafted vagina deteriorated following implantation with the stiffer mesh Gynemesh PS but not the lower stiffness meshes [in the study]. The cause for the tissue degeneration was found to be in large part related to mesh stiffness. In a previous study, we showed that the stiffness of a mesh is intrinsically related to its weight, pore size and porosity. Thus, it is likely that under physiologic loading conditions, a heavier weight, less porous, stiffer mesh will have a more negative impact on the underlying and newly incorporated vagina due to a maladaptive remodeling response induced in part by stress-shielding." This study directly correlates with information that was known or at least available to Ethicon regarding the negative effects on the pelvic floor tissues of the too-stiff Gynemesh PS mesh used in the Prolift product.

Based upon the current literature regarding armed TVM kits and the articles and abstracts regarding the Gynemesh PS mesh and Prolift products, upon what I have observed when I have removed Prolift mesh, and upon what I have learned from my review of Ethicon's internal documents and testimony, it is my opinion that the risks of implanting the Prolift far outweighed any perceived benefits, with unacceptable rates of mesh exposures, erosions, dyspareunia, urinary and bowel problems, chronic or permanent pelvic pain, painful mesh shrinkage, revisions

and re-operations in an attempt to address these complications, and reoccurrences of prolapse following mesh removal surgeries.

E. Ethicon had at its disposal a number of safer feasible alternative designs that could have been utilized.

Aside from the use of native tissue repairs, or non-surgical pelvic organ prolapse treatment like Kegel exercises and pessaries, there were several alternatives to the design of the Prolift kits that would have been safer and just as effective if not more effective. Some of these alternatives include, but are not limited to: elimination of the permanent mesh arms;[46] elimination of the armed, blind trocar passes; introduction of stress shielding to prevent pore collapse, mesh folding, and mesh deformation;[47] and/or use of alternative materials, such as biologic materials or polyvinylidene fluoride (PVDF/Pronova), which Ethicon recognized as safer than polypropylene.[48] Ethicon has developed and/or sold products that contain some or all of these safer design components and/or characteristics, leaving no question that it was feasible for Ethicon to develop a safer design. In fact, Ethicon internal documentation notes that compared to polypropylene, Pronova is "easier to manufacture and sterilize."[49]

F. General causation opinions

I have personally observed and treated patients who have been implanted with Ethicon Prolift products that experienced the following device-related complications:

- Chronic or permanent pelvic pain;
- Chronic or permanent inflammation of tissue surrounding mesh;
- Excessive scar plate formation, scar banding, and contracture of mesh arms, resulting in asymmetrical pulling on the central portion, causing pain;
- Erosion of mesh into the bladder and rectum and exposure of mesh in the vagina;
- Pudendal neuralgia;
- Pelvic floor muscle spasm;

- Nerve damage or nerve entrapment as a result of mesh scarification and encapsulation;
- Dyspareunia;
- Stress urinary incontinence and urge incontinence;
- Urinary retention;
- Constipation or fecal incontinence;
- Deformed, wrinkled, folded, curled, roped and fragmented mesh upon removal;
- Encapsulation of mesh (mesh covered in thick scar);
- Vaginal shortening, tightening, stenosis and/or other deformation of the pelvic anatomy;
- Infection as a result of the mesh, including bladder infections, vaginal infections, chronic urinary tract infections, and abscesses; and
- Recurrence of prolapse (failure of treatment).

The published medical literature also reports these same types of complications with transvaginal pelvic organ prolapse repair implants.[50]

Based upon my education, training, experience and knowledge, and my familiarity with the published literature relating to this subject, it is my professional opinion to a reasonable degree of medical certainty that the injuries and complications that I have personally observed, diagnosed, and treated, in patients who received Prolift implants, are directly attributable to the defective design of these products as described previously.

G. Instructions of Physicians and "Certification"

Ethicon"s physician training program for the Prolift kits was inadequate, and resulted in the "certification" of numerous physicians who were undertrained and who lacked the experience, skills and expertise necessary to properly perform the implantation of these products. I have firsthand knowledge of physicians that never went to training, had not attended a fellowship, nor had significant clinical experience to draw on, who performed their first Prolift surgery with the Ethicon representative in the OR " talking them through it." Corporate documents show that the company"s medical personnel recognized that the amount of training

necessary for these procedures was significant. The documents also show recognition that most physicians likely did not understand the proper technique for implanting Prolift. Ethicon's physician training activities and efforts, or lack thereof, as outlined below, rendered the Prolift kits not reasonably safe in the hands of most physicians:

1. Training courses for the Prolift kits were inadequate, and Ethicon documents reveal that the company recognized prior to launching the products that physicians would need to undergo a comprehensive course of training. For example, in 2004, Steve Bell, who at the time was Director of Marketing for Gynecare Europe, reported to Laura Angelini on "TVM – First training – key learnings."[51] Bell's statements underscored the importance of in-depth training, including comments such as: "The consensus is that some doctors will need more than one exposure to TVM surgery before they feel confident to be able to start the procedure (even those with high skill sets)." He also stated: "Cadavers may not give this full experience and where possible the training surgeons need to get hands on in live surgery by either „scrubbing in" where allowed…Or by having the preceptor got [sic] to their institution to help guide the passage of the needles." He also stated that even the KOL advisors reported that the procedure "was considered more technically challenging than they had thought."[52] I had practically this same conversation with my Ethicon sales representative's regional manager.

2. Ethicon failed to adequately convey to physicians how to position the Prolift implants in a tension-free manner, which is a significant omission of information considering Ethicon documents show that the tension-free nature of the kits was a key concept behind the products.[53] The importance of leaving an appropriate lack of tension in the arms is underscored by a number of Ethicon corporate documents. One Ethicon document showing investigation into a complaint includes remarks from Martin Weisberg, Senior Medical Director, that "the mesh

contraction issues that accompany placement of mesh in any animal model…is not only unavoidable, but must be accounted for in the size of the mesh and the tension (or lack of tensioning) of the mesh arms."[54] He went on to state: "With mesh contraction, the feeling of firmness is created. I have recommended careful attention to lack of tension in the mesh arms and leaving a large mesh body in each compartment so the unavoidable contraction of the mesh will not cause firmness of the vaginal walls.[55] While it is not clear with whom Weisberg is stating he shared this recommendation, the Prolift IFU clearly lacks any such information about careful attention to lack of tension in the mesh arms. In fact, the only reference to tension in the IFU appears in the Warnings and Precautions section, and merely warns to "Avoid placing excessive tension on the mesh implant during handling."[56] This warning not only fails to convey the importance of leaving no tension in the arms, the statement implies that tension should be placed, just not excessively. The statement also does not specifically reference the need for a lack of tension in the mesh arms.

Other corporate documents further confirm the importance of lack of tension during placement, and also show Ethicon's failure to provide this information to physicians. One 2006 internal presentation summarizing an Ethicon round table discussion includes a section regarding "Tensioning of Mesh."[57] The section includes statements that "The procedure is meant to be tension free. Loser [sic] is better than tighter. To get the right slack/tension the vagina must be closed, the apex at the correct height and the vagina should be packed."[58] Not only does this information provide details far beyond the scope of tensioning information covered in the IFU, the presentation actually states on each page: "**For Internal Use Only.** These Notes…are NOT to be substituted for or used as a complement to the GYNECARE PROLIFT Instructions for Use."[59] This information should have found its way into the IFU.

Corporate documents reflect that Dr. Aaron Kirkemo, Ethicon Associate Medical Director, recognized a "real misconception" among Prolift trained physicians "that leaving the cannuli in place until after the vaginal incisions are closed is to provide for a means to TIGHTEN the arms.[60] Kirkemo went on to state: "We need to really think about how to change our teaching to let people understand what post closure mesh tensioning means. Do we want to change it from mesh tensioning to mesh adjustment. When you think about it, tensioning usually connotes making tighter, not what we mean in the context of tension adjustment (read loosening).[61] Kirkemo's statements reflect Ethicon's overall failure to adequately convey to physicians how properly to place the Prolift kit tension-free.

Other corporate documents also show that Ethicon acknowledged a lack of understanding of the concept. In a 2009 email, Medical Affairs Director Piet Hinoul stated: "There is the issue of being able to adjust, fine tune the position of a Prolift mesh. This must also be addressed upfront; the mesh in Prolift can indeed be adjusted, but that is because one overcorrects (surgeons not adjusting by loosening after having pulled it too tight have all the problems with pain, incontinence, obstructed defecation), again we adjust to make it tension free not the other way around…This tension free concept is something we own…drs like the sound of it (despite the fact that most do not understand it!)"[62] Hinoul's remarks underscore not only the fact that failure to loosen the mesh during implantation can lead to complications, but also a recognition that most doctors do not understand the tension free concept.

In summary, Ethicon failed to instruct physicians on an important and basic concept behind the Prolift procedures: tension free placement.

3. Ethicon recruited to their Prolift training programs physicians who should not have been implanting the Prolift kits. In an internal memorandum authored by Axel Arnaud on

the "History of Prolift," Arnaud disclosed that he "had [a] hard time with some marketing people who wanted to kill this [Prolift kit] project as they found the procedure was too difficult and could only be a procedure for some happy few."[63] Around the time the Prolift kits were launched, Cheryl Bogardus, a Senior Product Manager, expressed to Arnaud and others that "Prolift is not a procedure for the masses due to the technical skill needed."[64] However, only about two months later, a corporate document shows that Ethicon lifted a restriction that would limit sale of the Prolift kits to "ONLY those hospitals that had trained physicians."[65]

Ethicon documentation also shows that Ethicon's Midwestern District Sales Manager remarked in a June 2006 email: "Too often we send surgeons to training on Prolift who in reality should only use Gynemesh at this time, but they want to train and if we don't, our competition will train them. The reps push the envelope on training because they don't want to see a repeat of the obturator wars…"[66]

In summary, the Ethicon corporate documents show that the company recognized that only a few select physicians should perform the Prolift implantation procedures, and yet the documents also reveal that Ethicon allowed a broad group of physicians to train, which resulted in non-expert surgeons performing a procedure that is unsafe in the hands of most surgeons.

I also have first-hand knowledge that Ethicon recruited and "certified" physicians who lacked the experience and expertise necessary to perform pelvic reconstructive surgery using mesh implants. Indeed, one of these physicians is listed in Ethicon documents as a KOL. This physician was "trained" in his office by the Ethicon representative and then "proctored" by the same sales rep in the OR.

DATA CONSIDERED IN FORMING MY OPINIONS

I considered the documents identified in the body and footnotes of this report, as well as those listed in Exhibit B attached hereto.

EXHIBITS WHICH I PLAN TO USE AS A SUMMARY OF OR IN SUPPORT OF MY OPINIONS

Exhibits which I plan to use as a summary of or in support of my opinions are as follows:

- Exhibits extracted from the materials that I have reviewed specific to this case (as described in references and/or footnotes contained within this report and referenced herein at Exhibit "B");
- Excerpts from medical articles and learned treatises;
- Examples and/or exemplars of the Prolift +M product(s);

COMPENSATION FOR MY REVIEW, STUDY AND TESTIMONY

For case review, consultation, and conference calls: $500/hr in 15 min increments

For trial testimony, $4,000/half day and $8,000/half day in 4 hour increments

For deposition, $600/hour with a minimum of a 4 hour charge

For travel time, $200/hour in 30 min increments plus expenses

Full payment for cancellation/rescheduling within 2 weeks

50% payment for cancellation/rescheduling within 4 weeks

OTHER CASES IN WHICH I HAVE TESTIFIED AS AN EXPERT AT TRIAL OR BY DEPOSITION IN THE LAST FOUR YEARS

A list of other cases in which I have testified as an expert at trial or by deposition within the preceding four years is as follows:

Cisson v. C.R. Bard

Dotres v. Boston Scientific

State v. _____ (rape case)

Mary Catherine Wise v. Ethicon – deposition

This 26th day of January, 2016.

Brian Raybon, M.D.

BRIAN RAYBON, M.D.

CERTIFICATE OF SERVICE

I hereby certify that on February 1, 2016, I served the **PLAINTIFFS' RULE 26(a)(2)(B) EXPERT REPORT OF BRIAN RAYBON, M.D.** on the following counsel of record by electronic mail:

Christy D. Jones
christy.jones@butlersnow.com
William Gage
william.gage@butlersnow.com
Butler, Snow, O'Mara, Stevens & Cannada, PLLC
1020 Highland Colony Parkway
Suite 1400 (39157)
P.O. Box 6010
Ridgeland, MS 39158-6010

David B. Thomas
dthomas@tcspllc.com
Thomas, Combs & Spann, PLLC
300 Summers Street, Suite 1380
P.O. Box 3824
Charleston, WV 25338-3824

By: */s/ Henry G. Garrard, III*
Henry G. Garrard, III
hgg@bbgbalaw.com
Georgia Bar No. 286300
Gary B. Blasingame
gbb@bbgbalaw.com
Georgia Bar No. 062900
Andrew J. Hill, III
ajh@bbgbalaw.com
Georgia Bar No. 353300
James B. Matthews, III
jbm@bbgbalaw.com
Georgia Bar No. 477559
Josh B. Wages
jbw@bbgbalaw.com
Georgia Bar No. 730098
Counsel for the Plaintiffs

Blasingame, Burch, Garrard & Ashley, P.C.
P.O. Box 832
Athens, GA 30603
(706) 354-4000

[1] ETH.MESH.05574856 (9/23/03 PowerPoint), Slide 4 (Emphasis in original).

[2] ETH.MESH.02923305 (8/15/05 email from consulting physician about Prolift) – "I thought I would just let you know that I find the safety profile quite worrying and hope that this will be discussed in some detail especially in view of the fact that we have no efficacy data to review. It is not that there were a lot of complications, its severity and type of complications and these were just the peri operative ones! I still have major concerns regarding the erosion rate and possible problems with dyspareunia and none of these have been addressed in the data which we have been given to date.").

[3] ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12061 and p. 12070 (Ethicon clinical study intended to support Prolift, showing failure of internal criteria for success, and showing *inter alia* 75.6% complication rate; 25.6% "serious" adverse event rate; 10% "severe" adverse event rate; 50% rate of adverse event requiring treatment; and a mesh-related adverse event rate of 66.7%); ETH.MESH.00821702 (9/26/07 internal memo reporting results of 2004 European clinical study of Prolift: 14% of patients suffered mesh exposure,19.6% suffered "painful mesh shrinkage," and the objective success rate was only 75.7% after only 18 months).

[4] ETH.MESH.02247342 (9/26/08 internal PowerPoint "The Journey from Prolift to Prolift +M") ("Polypropylene creates an intense inflammatory response.... The excessive inflammatory reaction to heavyweight Polypropylene tends to form a scar plate around the prosthetic that results in a firm and contracted mesh...."); ETH.MESH.13375497 (10/1/08 internal PowerPoint) – "Issues with Polypropylene Mesh • Excessive foreign body reaction • Chronic inflammation...• Scar plate formation • Stiffness...• „Shrinkage" 20-40%.").

[5] Williams, D.F., Review. Biodegradation of surgical polymers, Journal of Materials Science, Vol. 17, 1233-46 (1982) ("[t]he effects of these degradation processes will naturally vary, but generally there will be a change in average molecular weight, molecular-weight distribution, crystallinity and mechanical properties."); Ali, S.A.M., et al., The Mechanisms of Oxidative Degradation of Biomedical Polymers by Free Radicals, Journal of Applied Polymer Science, Vol. 51, 1389-98 (1994) (explaining that the oxidative process "will augment any tissue injury due to the invading organisms. These highly reactive radicals generated by cellular mechanisms at or near the surface of implanted polymers may contribute to damage of the polymer surface in the same fashion as established polymer degradation reactions by reactive radicals."); Zhong, S.P., et al., Biodeterioration/Biodegradation of Polymeric Medical Devices In Situ, International Biodeterioration & Biodegradation, Vol. 130, 95 (1994) (explaining "vicious cycle" between foreign body response to polymer implant material and degradation, stating "poor compatibility can result in serious tissue response, where different enzymes and active species released from cells can damage the implant profoundly, the degradation products then possibly making the tissue response even worse. Obviously, this is a vicious cycle, which needs to be avoided, as it may result in failure of the device and either morbidity or mortality in the patient."); Costello, C.R., et al., Materials Characterization of Explanted Polypropylene Hernia Meshes, J. of Biomedical Mater. Res. Part B: Applied Biomaterials, Vol. 83B(1), 44-49 (2007) (discussing mechanisms and harmful effects of the degradation of polypropylene inside the body, and

concluding that explant analyses were consistent with increased abdominal wall stiffness and patient complaints of chronic pain and restricted mobility); Clave, et. al., Polypropylene as a reinforcement in pelvic surgery is not inert: comparative analysis of 100 explants. IntUrogynecol J 2010 Mar; 21(3):261-70.

[6] ETH.MESH.03904451 (6/06/00 internal memo) – "The in vivo forces and exerted strains on pelvic floor repair during the postoperative period are not known. No studies on this subject were identified through literature search or interviews with experts."); ETH.MESH.05643313 (12/1/00 internal e-mail): "Unfortunately we did not measure the elasticity of endopelvic fascia in our animal studies."); HMESH_ETH_00602957 (8/21/06 internal e-mail) – "There are no data on physical and morphological outcome following vaginal implantation…."); ETH.MESH.02017154 (3/06/07 Minutes from an Ethicon Meeting) – "Need to learn more about special anatomic features in vaginal region" and noting that vagina is completely different from abdominal wall.); ETH.MESH.02141727 (5/09/08 internal PowerPoint) – "There is still NO evidence of a Device created specifically for the female pelvis." (p. 4); "Pelvic Floor materials are still over-engineered → we need less foreign body material → materials that correlate to measured female pelvic values." (p. 6).); ETH.MESH.02142351 (8/25/08 internal PowerPoint), p. 2 – "[New product design, which never went to market] will be the first PFR device designed specifically for the female pelvis."); ETH.MESH.09650760 (11/21/08 invention disclosure) – "Mesh based implants which are currently used in pelvic floor reconstruction are based on mesh constructions originally designed for the treatment of hernias in the abdominal wall region. It is important to understand that the biomechanical properties of the abdominal wall and the pelvic floor differ especially in regard of elasticity and anisotropic material behavior. To fulfil the desired biomechanical compatibility of mesh based implants for pelvic floor reconstruction, it is important to take the biomechanical properties of the implantation site into consideration."); ETH.MESH.00751733 (10/22/09 internal PowerPoint), p. 7 – "There is no patient-centric PF material!"; "Different mechanical properties are needed in different area of PF."); ETH.MESH.02227282 (11/14/09 PowerPoint), Slide 3 – Chart showing burst strength of Gynemesh PS is more than 10 times stronger than the maximum intravaginal pressure from physical activity and "Until now, there is no patient-centric POP repair material!! Pelvic Floor Materials are still over-engineered – we need less foreign body material – materials that correlate to measured female pelvic physiological characteristics."); ETH.MESH.02010834 (2/16/11 internal memo "Biomechanical consideration for Pelvic floor mesh design") – p. 2 ("The ideal mesh for prolapse repair which mimics precisely the biomechanical needs of the pelvic floor region has not been developed…. Pain and discomfort can result from stiff mesh that were originally designed for hernia surgery and „over-engineered" to exceed the burst strength of the abdominal wall at the cost of losing compliance [citing 2009 literature]…. [T]here is significant evidence that the complications associated with synthetic meshes can cause significant morbidity including infection, erosion, exposure, and pain [citing 2000 and 2007 literature]…. In addition, the vaginal tissue to be augmented in often structurally compromised, atrophic, and devascularized…. Moreover, there is evidence that meshes shrink in vivo leading to increased stiffness, pain, and poor restoration of the normal properties of the vagina compliance [citing 2009 literature]. Research has demonstrated that bioprosthetic mesh implantation results in a scarring reaction and subsequent decreased compliance [citing 2009 literature].");

ETH.MESH.08315779 (9/25/12 Ethicon internal report), p. 5782 – "[S]ynthetic mesh implants, even the lower mass mesh implants, are significantly stronger than required.").

[7] Liang, et al., Vaginal Degeneration Following Implantation of Synthetic Meshes with Increased Stiffness, BJOG. 2013 January: 120(2):233-243.

[8] ETH.MESH.01994703 (8/23/07 e-mail chain regarding Lobodasch cadaver lab and clinical experience with Gynemesh PS) ("Yes. Dr. L said he likes that the UP mesh straps are less crumpled and entangled after pullout of the mesh from the cadaver, than the Gynemesh PS. In my own summation, he prefers the UP because it appears to have less memory and not retain creases and bunching upon placement. In our US labs with Dr. Miller, Sepulveda, etc. it was noted by us that upon removal, UP had not reached its elastic limit like PS does (it was not all stretched out at the root of the straps as is seen in Gynemesh PS).").

[9] ETH.MESH.05631478 (8/16/02 internal e-mail discussing article describing mesh-related nerve injury – ("In the post retrieval study most explants of all patients with chronic pain in their history indicate nerve fibres and fascicles in the interface of the mesh. Today, immunohistochemical stains relieve even the detection of smallest nerve structures which are mainly found in the foreign body granuloma. Due to the nature of the granuloma as a chronic inflammation it may be speculated that these nerve structures are irritated by the inflammation and cause the sensation of pain"); ETH.MESH.05455878 (1/18/03 Ethicon Surgeon Panel meeting notes) – Ethicon surgeon advisor told Ethicon "Some rate of long term risk to humans of…nerve entrapment with chronic pain…often the result of tiny nerves in the granuloma…even if you care for the big nerve you can"t prevent pain."); HMESH_ETH_00343700 (7/6/06 internal document commenting on published article) ("in the authors' postrieval study the involvement of nerve fibers was found in more than 60% of all mesh specimens removed due to chronic pain."); HMESH_ETH_01801001 (10/11/06 internal e-mail re: published article) – "The article highlights that 60% of pain related issues in hernia repair are contributed to disturbance with nerve."); HMESH_ETH_00144721 (2/11/08 internal e-mail) – "Peripheral nerve irritation following synthetic mesh implantation can be implant-related or procedure-related. Implant-related factors include foreign body tissue reaction, fibrotic tissue response and shrinkage."); ETH.MESH.13375497 (10/1/08 internal PowerPoint) (Regarding mesh-related pain "The tissue reaction at the mesh implant is like a chronic wound, present for years and years after the implantation," and studies of explanted meshes show "Nerve fibers and fascicles in the interface of the mesh…The nerve structures are irritated by the inflammation an cause sensation of pain."); Smith T, et al., Pathologic Evaluation of Explanted Vaginal Mesh: Interdisciplinary Experience from a Referral Center. Female Pelvic Med Reconstr Surg 2013; 19:238-41; Klosterhalfen, et al., The Lightweight and Large Porous Mesh Concept for Hernia Repair. Expert Rev. Med. Devices 2(1) 2005; Castellanas ME et al., Pudendal Neuralgia After Posterior Vaginal Wall Repair with Mesh Kits: An Anatomical Study and Case Series. Journ Minimally Invasive Gynecol 19 (2012) S72.

[10] ETH.MESH.12003000 (1/21/09 literature review) – concluding "The blind passage of the trocars in the TVM procedure could cause injury of the surrounding anatomical structures.").

[11]Junge, Elasticity of the anterior abdominal wall and impact for reparation of incisional hernias using mesh implants; Hernia 2001; 5: 113-118.

[12]Vollebregt, et. al., Bacterial colonization of collagen coated PP vaginal mesh: are additional intraoperative sterility procedures useful? Int. Urogynecol J Pelvic Floor Dysfun. 2009 Nov; 20(11): 1345-51; ETH.MESH.03924600 - (11/10/00 internal memo): "vaginal approach to avoid bacterial environment (the vaginal environment is a notoriously dirty one with abundant bacterial flora; avoidance of bacteria is impossible when employing the vaginal route of application.").

[13] ETH.MESH.05455879 (1/18/03 notes from Surgeon Panel Meeting) - "Polypropylene - initial acute inflammation then chronic foreign body reaction….Reaction after 6 years."); ETH.MESH.02017153 (3/06/07 Minutes from an Ethicon Expert Meeting) ("Polypropylene meshes might not be improvable in terms of shrinkage, we may need a completely new material…."); ETH.MESH.02247342 (9/26/08 internal PowerPoint "The Journey from Prolift to Prolift +M") ("Polypropylene creates an intense inflammatory response…. The excessive inflammatory reaction to heavyweight Polypropylene tends to form a scar plate around the prosthetic that results in a firm and contracted mesh…."); ETH.MESH.00271215 (10/29/08 internal e-mail) – Polypropylene is "the best of a bad lot re integration/retraction" and "there is a need to develop grafts that mimic the human tissue mechanical properties."); ETH.MESH.00680021 (11/12/08 internal e-mail) – "Polypropylene creates an intense inflammatory response that results in rapid and dense incorporation into the surrounding tissue. The excessive inflammatory reaction caused by heavyweight meshes tends to form a scar plate around the prosthetic that results in a firm and contracted mesh."); ETH.MESH.03722384 (9/17/09 internal e-mail) – "We're seeing a lot of work published that indicates that polypropylene produces an ongoing, chronic inflammatory reaction…Might be better off working with something that is less reactive, like PVDF."); ETH.MESH.01238483 (4/27/09 internal memo) – "Vaginal discomfort is the most troublesome complication of transvaginal mesh and mostly determined by ... Host interaction with the mesh as it relates to chronic inflammation, excessive fibrosis and 'stiffness' from scar plating creating nerve entrapment and or nerve tethering.""); ETH.MESH.05237872 (Nov. 3-4, 2010 "Mesh and Textile Summit") – PowerPoint addressing downsides of "old fashioned" (i.e., polypropylene mesh): "Excessive foreign body reaction; Chronic inflammation; Decreased fibrocollagenous ingrowth; Scar plate formation; Shrinkage from bridging fibrosis.").

[14] ETH.MESH.12009657 – (4/06/01 internal memo listing disadvantages of Prolene Soft Mesh/Gynemesh PS) – "VOC: too stiff for use in vaginal tissues."); ETH.MESH.02141727 (5/09/08 internal PowerPoint) – "There is still NO evidence of a Device created specifically for the female pelvis." (p. 4); "Pelvic Floor materials are still over-engineered → we need less foreign body material → materials that correlate to measured female pelvic values." (p. 6)); ETH.MESH.09650760 (11/21/08 invention disclosure) – "Mesh based implants which are currently used in pelvic floor reconstruction are based on mesh constructions originally designed for the treatment of hernias in the abdominal wall region. It is important to understand that the biomechanical properties of the abdominal wall and the pelvic floor differ especially in regard of elasticity and anisotropic material behavior. To fulfil the desired biomechanical compatibility of mesh based implants for pelvic floor reconstruction, it is important to take the biomechanical

properties of the implantation site into consideration."); ETH.MESH.02010834 (2/16/11 internal memo "Biomechanical consideration for Pelvic floor mesh design") – p. 2 ("The ideal mesh for prolaps repair which mimics precisely the biomechanical needs of the pelvic floor region has not been developed…. Pain and discomfort can result from stiff mesh that were originally designed for hernia surgery and „over-engineered" to exceed the burst strength of the abdominal wall at the cost of losing compliance [citing 2009 literature]…. [T]here is significant evidence that the complications associated with synthetic meshes can cause significant morbidity including infection, erosion, exposure, and pain [citing 2000 and 2007 literature]…."); ETH.MESH.08315779 (9/25/12 Ethicon internal report), p. 5782 – "[S]ynthetic mesh implants, even the lower mass mesh implants, are significantly stronger than required.").

[15] ETH.MESH.00870467 ETH.MESH.02017153 (3/06/07 Minutes from an Ethicon Expert Meeting) – "Prof. Cosson questions if Polypropylene is the best material as fractures are observed in pp [sic] after time."); HMESH_ETH_02860031 (7/06/07 internal e-mail from Ethicon Research Fellow regarding "dog" study) – "I recall the long-term dog study did show some „fibrillation" ofPROLENE suture where none was observed for PRONOVA suture. My polymer colleagues tell me that PP has the potential to do this because of its molecular structure."); ETH.MESH.05588123 (7/09/07 internal memo responding to mesh degradation literature) – "There have been a number of anecdotal reports that PP mesh shows some changes in the surface with time. The Aachen group, who has so far collected more than 1000 explanted meshes, showed examples many years back…. We did different tests in-house with accelerated aging, too, and found microscopic changes in the surface of mesh fibres."); HMESH_ETH_00228962 (2/17/10 internal e-mail chain discussing literature about polypropylene degradation) – "[W]e know from literature that polyester and even polypropylene tend to alter over time in the body…. [H]ow has the general surgery group responded to this [degradation literature]?...[W]e proposed for several new product developments...to use PVDF or PRONOVA as a more stable filament, however Senior Management decided to go ahead with PP as a standard." (HMESH_ETH_00228961)); ETH.MESH.10578304 (1/18/11 Minutes of PA Consulting Group Meeting regarding Mesh Erosion) – "PP meshes degrade over time following implant; this is observed at very high magnification (using electron microscopy) as „fractures" in the surface of the extruded fibres which cause particulates of PP to be produced which can break away from the main fibre."); ETH.MESH.14445346 (1/17/12 PowerPoint), Slide 11 (comparing Polypropylene to PVDF) – "PP – Stress cracking after 2 years of implantation [citing Mary article from 1998]… PP – In vivo degradation of PP [citing Clave article from 2009]."); ETH.MESH.07726993 (3/12/12 Ethicon internal memo in response to article reporting polypropylene mesh degradation) – "In an infected field and/or a site of chronic inflammation, it is not unexpected that there will be an increase in free radicals and other reactive oxygen species. Polymers may be subject to surface degradation by these reactive species, the impact of which has not been clinically assessed.").

[16] ETH.MESH.03928881 (1/11/05 internal e-mail from Ethicon European Medical Director urging that warning be added to Prolift IFU) – "WARNING: Early clinical experience has shown that the use of mesh through a vaginal approach can occasionally/ uncommonly lead to complications such as vaginal erosion and retraction which can result in anatomical distortion of the vaginal cavity that can interfere with sexual intercourse….This must be taken in

consideration when the procedure is planned in a sexually active woman."); ETH.MESH.03915690 (5/13/05 internal memo) –" [Gynemesh PS for POP repair]…can lead to other complications such as…mesh retraction…. Mesh retraction („shrinkage") is a more uncommon complication but it is considered more serious. It can cause a vaginal anatomic distortion, which may eventually have a negative impact on sexual life. Its treatment is difficult."); ETH.MESH.03906579 (6/09/05 interview with Ethicon European Medical Director) – "Shrinkage is due to an excessive scarring process...in a few cases it led to vaginal distortion impacting the sexual life. Thus, the procedure must be used cautiously in sexually active women."); ETH.MESH.02017153 (3/06/07 Minutes from an Ethicon Expert Meeting) ("Polypropylene meshes might not be improvable in terms of shrinkage, we may need a completely new material… Unmet clinical needs: No shrinkage/no long term contraction… Severe contraction –> Dyspareunia –> sexual function ↓.").

[17] ETH.MESH.00870467 (6/20/06 notes re: Ethicon Expert Meeting) – "Optimum pore size is material dependent (critical pores size; at least 1-2mm), scar formation a combination of pore size, surface area, polymer…. Small pores: interconnection between mesh pores due to fibroses leading to mesh shrinkage…. Tension of the mesh changes pore size → change in elasticity…."); ETH.MESH.01752532 (9/18/06 internal memo) – "Large-pore mesh integrates in a loose network of perifilamentous fibrosis with fat tissue present in between. In contrast, the small-pore mesh incorporates entirely in perifilamentary granulomas and scar tissue, which bridged the whole pore diameter of less than 1 mm [citing literature from 2002]. It appears that the greater distance between pores resists the ability of „bridging fibrosis" …, contributing to improved compliance and theoretically less passive compression or shrinkage of the biomaterial…. The applicability of meshes as a prosthesis in the pelvic floor region is dependent on various mesh properties. A suitable mesh should offer a pore size >1mm and feature lightweight properties to avoid the occurrence scar plate formation."); ETH.MESH.10511708 (12/12/06 internal R&D PowerPoint "State of Knowledge in Mesh Shrinkage") – "The tissue incorporation of a mesh prosthesis is proportional to its pore size, since macroporous structures are required for the entrance of macrophages, fibroblasts, blood vessels and collagen fibers. Larger pores allow for faster ingrowth into the mesh, which results in less contraction. On the other hand, the small pore mesh incorporates entirely in perifilamentary granulomas and scar tissue, which bridge the whole pore diameter. This so called „fibrotic bridging" is a phenomenon that is believed to be closely related to mesh shrinkage and is usually observed in all mesh modifications with pore sizes of less than 1 mm…. Conclusion - the „ideal mesh": Taking all these abovementioned facts into consideration, the ideal mesh could appear as follows:… pore size > 1mm."); ETH.MESH.01782867 (2/24/07 internal PowerPoint "Factors related to mesh shrinkage"), p. 6 – "Small porous meshes (<1 mm) lead to „fibrotic bridging" → increased shrinkage…. Pore size – The tissue incorporation of a mesh prosthesis is proportional to its pore size… Larger pores allow for faster ingrowth into the mesh, which results in less contraction. On the other hand, the small pore mesh incorporates entirely in perifilamentary granulomas and scar tissue, which bridge the whole pore diameter. This so called „fibrotic bridging is a phenomenon that is believed to be closely related to mesh shrinkage and is usually observed in all mesh modifications with pore sizes of less than 1mm."); ETH.MESH.02588170 (1/22/08 internal memo regarding desired mesh design features) – "4. shrinkage/stiffening 1. pore size > 3 mm 2. pore size > 1 mm under stretch (mesh + stress shielding component only) • stress

shielding of mesh implant (duration < 7d) (Abramov 2006)....Mesh pore size varies under the impact an applied load."); ETH.MESH.02247342 (9/26/08 internal PowerPoint "The Journey from Prolift to Prolift +M") ("The excessive inflammatory reaction to heavyweight Polypropylene tends to form a scar plate around the prosthetic that results in a firm and contracted mesh....Bridging occurs in all mesh modifications with a granuloma size around each mesh fiber exceeding more than half of the pore size of the mesh. Desirable pore size > 1mm."); ETH.MESH.02010834 (2/16/11 internal memo "Biomechanical consideration for Pelvic floor mesh design") – p. 13 ("Lightweight mesh with reduced polypropylene density and larger pore sizes between filaments has shown a pronounced reduction in inflammation and improved integration into surrounding tissue in humans [citing 1999 literature].... Large-pore mesh integrates in a loose network of perifilamentous fibrosis with fat tissue present in between. In contrast, the small-pore mesh incorporates entirely in perifilamentary granulomas and scar tissue, which bridged the whole pore diameter of less than 1 mm [citing 2002 literature]. It appears that the greater distance between pores resist the ability of „bridging fibrosis"..., contributing to improved compliance and theoretically less passive compression or shrinkage of the biomaterial."), p. 14 ("[P]ore size is a crucial measure for the safety and efficacy of mesh implants. Whether or not an implant may be exposed to scar plate formation is determined, in part, by the obtained pore size.").

[18] ETH-00252.

[19] ETH.MESH.12873534 (10/25/13 internal e-mail "Poresize for Prolene Soft Mesh") (showing measurements of pores averaging .03, .04, .07, .10, .11, .12, .40, .44, .47, .54 mm^2; the average pore size across all measured pores < 1 mm^2). Not all pores were measured.

[20] HMESH_ETH_00120151 (1/28/13 internal e-mail regarding pore size of Prolene Soft) "[P]ore size measurements vary if the mesh is pulled even lightly in any direction.").

[21] ETH.MESH.00877490 (9/8/05 Prolift Poster Presentation by Michel Cosson) "„We can recommend the use of mesh for prolapse surgery, especially patients with big prolapses, and recurrent prolapses," he said, noting that women with grade 4 prolapse and greater are better suited for mesh surgery than patients with less severe disease.").

[22] ETH.MESH.03910418 (11/25/02 internal e-mail regarding, inter alia, mesh shrinkage in TVT) – "As we discussed the shrinkage rate is influenced by many parameters as the degree of fibrotic reaction is dependent on the mesh material/weave/width etc. I remember that Axel [Arnaud, Ethicon"s European Medical Director] was using 30% shrinkage as a rule of thumb...."); ETH.MESH.00584846 (5/10/04 internal e-mail) – "Their [consulting physicians"] main concern is now the shrinkage of the mesh which may lead to pain, dyspareunia...Indeed now that they have tremendously improved the technique and lowered the erosion rate what needs to be improved is the shrinkage of the mesh (in this case gynemesh soft)."); ETH.MESH.00681364 (9/07/04 internal report) – "GYNEMESH PS today has a 'swirling effect' causing what doctors have expressed as 'shrinkage or contraction of the mesh'. It isn't the mesh that's contracting, it"s the tissue that seems to be 'bunching' up resulting in the desire to have a more 'tension-free' fixation."); ETH.MESH.05574759 (1/18/05 internal e-mail reporting surgeon"s experience with

use of Gynemesh in pelvic floor repair) – "a. contraction pulls against the side wall and causes pain b. it causes a hard tissue which can be felt by patient and sexual partner c. it can lead to a balling up of the mesh which is very uncomfortable d. it can lead to suture line dehiscence e. it can lead to prolapse recurrence.... 5) he confirmed our thoughts regarding the correlation between inflammation, foreign body response and scar formation."); ETH.MESH.05246528 (3/10/05 report discussing areas impacting clinical outcomes with mesh) – "Tissue contraction (20-40%), Scar formation = recurrence or dyspareunia...Erosions - potentially address through technique."); ETH.MESH.04020138 (4/13/05 e-mail from Ethicon engineer) – "In pelvic floor repair even with the PSM, we have seen some scar contracture which translates into procedural complications... [S]urgeons who are our consultants on the ProLift product are asking for a mesh which is better than PSM in this area." (Id.). "The surgeons attribute these conditions [recurrence of prolapse, pain, stiffness, erosion and discomfort during sex] to scar contracture."); ETH.MESH.03915690 (5/13/05 internal memo) –"Although [Gynemesh PS for POP repair] significantly reduces recurrences, as compared to traditional repair, it can lead to other complications such as...mesh retraction.... Mesh retraction („shrinkage") is a more uncommon complication but it is considered more serious. It can cause a vaginal anatomic distortion, which may eventually have a negative impact on sexual life. Its treatment is difficult."); ETH.MESH.03906579 (6/09/05 interview with Ethicon European Medical Director, Axel Arnaud) – "Shrinkage is due to an excessive scarring process...in a few cases it led to vaginal distortion impacting the sexual life. Thus, the procedure must be used cautiously in sexually active women."); ETH.MESH.05243265 (1/24/06 e-mail discussing meeting with consulting physicians in Europe) – "Their [physicians'] main concern is the believe that the Prolene Soft material over time contracts. Thus creating the potential for failures and/our erosions."); ETH.MESH.03906525 (1/27/06 internal PowerPoint by Ethicon's European Medical Director), Slide 30 ("Mesh must not shrink. Rationale: to preserve the vaginal anatomy and to avoid recurrences. Theory: The scar tissue naturally shrinks up to 70% in the wound area during the healing process. Physiological wound contraction increases with the extent of inflammation. Shrinkage could be minimized by reducing the inflammatory reaction: well tolerated material, large pores."); ETH.MESH.00585938 (2/13/06 internal report on meeting of physician consultants): "The [TVM] group is strongly looking forward to the potential for new materials for the Prolift product. Their main concern is the believe that the Prolene Soft material over time contracts. Thus creating the potential for failures and/our erosions."); ETH.MESH.00870466 (6/2/06 Expert Meeting Memo) ("Shrinkage of 20% means reduction of mesh area to 64%."); ETH.MESH.03160750 (11/15/06 internal e-mail from Ethicon European Medical Affairs Director) – "It came up that there are two issues with Prolift: erosion and shrinkage...The responsibility of the mesh seems to be more established regarding shrinkage...."); ETH.MESH.10511708 (12/12/06 internal R&D PowerPoint "State of Knowledge in Mesh Shrinkage") – "„Shrinking meshes" are a topic of discussion and concern among hernia surgeons. It is believed that mesh shrinkage may lead to patients' discomfort, chronic pain or hernia recurrence.... Mesh shrinkage was evaluated at different time points and the reduction of the calculated area was 12% at one month, 24% at 3 months, 29% at 6 month and 34% at 12 month. [citing 2006 literature]"); ETH.MESH.02017153 (3/06/07 Minutes from an Ethicon Expert Meeting) ("Polypropylene meshes might not be improvable in terms of shrinkage, we may need a completely new material... Unmet clinical needs: No shrinkage/no long term contraction... Severe contraction → Dyspareunia → sexual function ↓."); ETH.MESH.00821702 (9/26/07

internal memo reporting results of 2004 European clinical study of Prolift), Slide 23 – ("Functional results: painful mesh shrinkage. Painful mesh shrinkage (at vaginal examination) – 21 patients (19.6%).... Correlation between painful mesh shrinkage and dyspareunia but not systematic."); ETH.MESH.01818382 (12/20/07 Ethicon Mesh Contraction preclinical study) (27% shrinkage (measured radiographically) and 23% (measured by image analysis), as well as fibrotic bridging, folding, rippling and distortion, for Prolene Soft in the subcutaneous model after 13 weeks implantation); ETH.MESH.00836975 (3/28/08 internal e-mail from Ethicon Worldwide Medical Director responding to question about how to identify and complications associated with mesh shrinkage) – "First, the mesh doesn"t shrink. As collagen grows into the mesh, the entire mass contracts.... In the patient, it can be noted with stiffening of the vaginal wall (causing dyspareunia) or bunching of the Prolift straps (which can cause pain). All patientsw getting mesh get contraction."); ETH.MESH.01238483 (4/27/09 internal memo) – "Vaginal discomfort is the most troublesome complication of transvaginal mesh and mostly determined by ... Host interaction with the mesh as it relates to chronic inflammation, excessive fibrosis and 'stiffness' from scar plating creating nerve entrapment and or nerve tethering."); ETH.MESH.02227282 (11/14/09 PowerPoint), p. 7 – "Folding of mesh is one cause for erosion and pain."); ETH.MESH.05479695 (Nov. 3-4, 2010 Mesh and Textile Summit PowerPoint) – "There is no place for a „Heavyweight Mesh" in modem pelvic floor repair... Polypropylene Mesh – Small pore size (<1 mm)... Issues with small pore meshes –...Increased inflammatory response results in rigid scar plate formation – Scar plate responsible for shrinkage of mesh up to 40% [citing published literature from 2002 and 2004].").

[23] ETH.MESH.00821702 (9/26/07 internal memo reporting results of 2004 European clinical study of Prolift).

[24] ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12070.

[25] ETH.MESH.02001398 (Prolift IFU version P19070/G).

[26] ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12061.

[27] ETH.MESH.01203957 (11/15/08 PowerPoint slide authored by Piet Hinoul), Slide 8.

[28] ETH.MESH.05631478 (8/16/02 internal e-mail discussing article describing mesh-related nerve injury – ("In the post retrieval study most explants of all patients with chronic pain in their history indicate nerve fibres and fascicles in the interface of the mesh. Today, immunohistochemical stains relieve even the detection of smallest nerve structures which are mainly found in the foreign body granuloma. Due to the nature of the granuloma as a chronic inflammation it may be speculated that these nerve structures are irritated by the inflammation and cause the sensation of pain"); ETH.MESH.05455879 (1/18/03 notes from Surgeon Panel Meeting) – "Nerve entrapment with chronic pain - Persistent chronic pain from foreign body reaction – greater fibrosis greater complaints – Scar plate with nerve entrapment – sometimes after one year there are no complaints and then complaints happen – often the result of tiny nerves in the granuloma not just a matter of not damaging the major nerves such as N ilioinguinalis or R genitalis - even if you care for the big nerves you can't prevent pain.");

ETH.MESH.00870466 (6/20/06 notes re: Ethicon Expert Meeting) – "Meshes can cause Nerve damage due to mechanical irritation (mesh bears on nerve).... Vaginal pain after implantation of meshes is rare, but feared, since there is not real treatment option"); HMESH_ETH_01800994 (10/11/06 internal e-mail chain discussing mesh pain/shrinkage literature) ("The take home message from the article was that chronic pain can be associated with placement of a mesh device.... [The author] continues to point out that neuropathy-related complaints after intraoperative damage of nerve fibers is associated with pain immediately after surgery, however, the onset of chronic pain as a consequence of the „foreign body reaction" is typically more than one year after the hernia repair. He goes on to point out that patients that reported chronic pain demonstrated nerve fibers and fascicles in the interface of the mesh upon examination upon removal."); HMESH_ETH_00144721 (2/11/08 internal e-mail) – "Peripheral nerve irritation following synthetic mesh implantation can be implant-related or procedure-related. Implant-related factors include foreign body tissue reaction, fibrotic tissue response and shrinkage."); ETH.MESH.13375497 (10/1/08 internal PowerPoint) (Regarding mesh-related pain "The tissue reaction at the mesh implant is like a chronic wound, present for years and years after the implantation," and studies of explanted meshes show "Nerve fibers and fascicles in the interface of the mesh...The nerve structures are irritated by the inflammation an cause sensation of pain."); ETH.MESH.01238483 (4/27/09 internal memo) – "Vaginal discomfort is the most troublesome complication of transvaginal mesh and mostly determined by ... Host interaction with the mesh as it relates to chronic inflammation, excessive fibrosis and 'stiffness' from scar plating creating nerve entrapment and or nerve tethering."); ETH.MESH.05479695 (Nov. 3-4, 2010 Mesh and Textile Summit PowerPoint) – "Studies of explanted meshes: • Nerve fibers and fascicles in the interface of mesh • The nerve structures are irritated by the inflammation and cause sensation of pain [citing 2005 article].").

[29] ETH.MESH.00900574 (2/05/04 email between Research & Development manager and physician who participated in Prolift developments) "Since you became aware of the potential for tissue tearing during strap placement, have you been able to observe this phenomenon in surgery?" "yes many times unfortunately, with in these cases the problem of the mesh being to large at the end of the procedure, already shrinking.... I think that it is a major concern.").

[30] ETH.MESH.03911687 (11/25/05 e-mail discussing European physician expressing concerns about Prolift arms) – "[doctor] believes that, after retrieval of the canula, the straps take a rope-like shape which is not optimal in his opinion. He has observed that some patients have discomfort as they can feel the straps with Prolift."); ETH-48281 (3/5/09 internal e-mail) ("[Competing mesh manufacturer] has been talking to doctors about the „banding" effect that occurs with the anterior Prolift... The banding that customers are telling me occurs at the edge of the mesh near the apex. Regardless of how doctors adjust the mesh, there is still a definite ridge or banding that can be vaginally palpated with our anterior mesh."); ETH.MESH.04097128 (May 1, 2009 internal e-mail discussing mesh arm "banding") – "the reported clinical information described a post-operative PROLIFT Mesh arm „banding"..., which led to the mesh recipient"s „discomfort" during sexual intercourse. „Mesh banding" describes tension build up on a given part of the pelvic floor mesh. The tension might have been introduced to the mesh at the time of mesh placement, or tension could have built up on the mesh arm as pelvic tissue incorporation into the mesh progressed. Tissue incorporation into the PROLIFT Mesh is an

expected in vivo mesh behavior…."); ETH.MESH.07171404 (9/03/09 internal e-mail regarding alternative design to Prolift arms) – discussing how new mesh design "is fixed in a very different (more „dynamic") way than Prolift (fixed and really pulling on the ligaments and muscles via the arms)", and explaining that new products "offer a similar solution to the shrinkage and curling of the mesh" seen with Prolift.); ETH.MESH.08020093 (2/10/10 internal e-mail) ("many docs still split Prolift when using it, and Prosima might be a better option for those docs. We aren"t seeing the banding (ridge of tissue) from spine to spine that we see with other anterior mesh kits. Probably because we don"t have attachment points….").

[31] ETH.MESH.07237575 (9/19/11 internal e-mail containing Medical Director"s response to inquiry about mesh repair systems without arms) – "Mr. Hinoul explains that the arms were meant to keep the mesh in place, but it appears to be technically (too) difficult for surgeons: often they do not go deep enough, which could result in folding of the mesh and exposure of the arms. That is why other types were developed, also by Ethicon. Mr. Hinoul shows examples the Prolift and Prolift +M meshes. Efforts were made to make the mesh lighter and more absorbable than the Ultrapro mesh for hernia, which was rather stiff. More density of the mesh causes more scars. The mesh itself does not shrink, scar tissue is the problem. This problem is not described in the Patient Information Folder, though it is mentioned under „Pain."").

[32] ETH.MESH.01771546 (6/28/06 Clinical Study Report), p. 1550 – clinical study reflecting rates for incontinence (20%) and voiding dysfunction (10.6%)); ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12062 – clinical study reflecting 26.7% incontinence rate and 22.2% urinary tract infection rate); ETH.MESH.00821702 (9/26/07 internal memo reporting results of 2004 European clinical study of Prolift) – reporting several types of "de novo" voiding problems with rates); ETH-80249 (10/28/05 e-mail from Ethicon Med. Dir. David Robinson, describing Prolift Total cases: "In folks with normal pre-op voiding function, who then post Prolift can"t void [due to bladder atony]…. Some have resolved spontaneously but have taken as long as a year to do so…[t]he cases seem to have no common thread or any difficulty with the surgery itself. But if this starts getting reported, it is going to scare the daylights out of docs…."); ETH-80297 (1/26/06 e-mail chain re: revision of Prolift IFU: "Dissection for Prolift and any similar procedure has the potential to impair normal voiding for variable length of time."). See also, ETH-01762 (proposed revised IFU to include voiding dysfunction warning).

[33] de Tayrac R et al., Complications of POP Surgery and Methods of Prevention, Int. Urogynecol. J. 2013; 24:1859-1872.

[34] Karram M, Maher C, Surgery for Posterior Wall Prolapse. Int. Urogynecol. J. 2013; 24(11): 1835-41.

[35] Maher C, Anterior Vaginal Compartment Surgery. Int. Urogynocol. J. 2013; 24:1291-1802; Ostergard D, Evidence-based Medicine for Polypropylene Mesh Use Compared with Native Tissue Repair. Urology 79: 12-15, 2012.

[36] Gutman et al., Three-Year Outcomes of Vaginal Mesh for Prolapse. Obstet Gynecol 2013; 122:770-7.

[37] ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12070.

[38] ETH.MESH.00012009 (6/27/06 Clinical Study Report), p. 12061.

[39] ETH.MESH.00741137 (6/26/06 memo to Ethicon) – "Prof. Jacquetin"s data has not proved as positive as hoped – showing approx 80% success rate – The data will be initially presented at IUGA in September. Note that this data is a retrospective study of over 100 patients using TVM technique, not necessarily Prolift. This less than 90% success rate forces us to differentiate Prolift from the TVM technique moving forward.").

[40] ETH.MESH.01771546 (6/28/06 Clinical Study Report).

[41] ETH.MESH.01771546 (6/28/06 Clinical Study Report), pp. 1550, 1575, 1586-87, 1592 and 1594.

[42] Id., p. 1588.

[43] Id.

[44] ETH.MESH.00821702 (9/26/07 internal memo reporting results of 2004 European clinical study of Prolift).

[45] Liang, et al., Vaginal Degeneration Following Implantation of Synthetic Meshes with Increased Stiffness, BJOG. 2013 January: 120(2):233-243;

[46] ETH.MESH.00857704 (2/12/09 internal e-mail regarding future mesh design advantages) – "Absorbable distal arms that will reduce discomfort like leg pain, buttock irritation, etc."

[47] ETH.MESH.02588172 (1/22/08 internal document) – "Mesh pore size varies under the impact [of] an applied load." Report compared mesh with stress shielding to mesh without stress shielding. States of mesh without stress shielding: "microscopic view: reduced pore size due to collapsed pores." States of mesh with stress shielding: "microscopic view: no change of pore size under load, due to stress shielding strategy"; ETH.MESH.02141727 (5/9/08 internal PowerPoint presentation on future product development) slide 6 – "Stress shielding needed to avoid pore-collapse, deformation and pre-stretch"; ETH.MESH.00857704 (2/12/09 internal email regarding future mesh design advantages) – "Temporary stress shielding of the graft reduces folding, deformation, crumbling.. that lead to erosion, pain, etc."

[48] ETH.MESH.09888188 (10/15/92 internal study report) – "Degradation in PROLENE is still increasing and PVDF, even though a few cracks were found, is still by far the most surface resistant in-house made suture in terms of cracking"; ETH.MESH.05644809 (8/2/01 internal notes) – "Advantages of Pronova • 50% reduced granuloma (Aachen group) • high inertness (like Teflon) • durability • reduced bending stiffness (better flexibility) • elasticity (fiber elasticity contributing 25% to mesh elasticity, rest by construction) • higher purity (only a blend)";

ETH.MESH.05588125 (7/6/07 internal email) – Dr. Dieter Engel: "Pronova has a reduced foreign body reaction compared to Prolene, as shown in several animal studies, and will improve the perceived biocompatibility of our mesh"; ETH.MESH.05878699 (9/13/07 internal study report) – Prof. Klosterhalfen: "Pronova [compared to Prolene] indicates a superior biocompatibility in the crucial early stage of wound healing within the first weeks"; ETH.MESH.15377374 (8/12/09 internal communication to a supplier) – "…PVDF polymers showed acceptable and often improved performance as compared to PP mesh devices. We have previously shared the preclinical biocompatibility studies for PRONOVA suture (report dated June 1998). Similar findings would be expected for a mesh device made from PRONOVA blend materials"; ETH.MESH.03722384 (9/16/09 internal e-mail) Dr. Thomas Divilio: "We're seeing a lot of work published that indicates that polypropylene produces an ongoing, chronic inflammatory reaction…Might be better off working with something that is less reactive, like PVDF"; ETH.MESH.00857704 (2/12/09 internal e-mail regarding future mesh design advantages) – "If we use PRONOVA a more elastic fiber which shows less degradation than PP. Better, longer function of Implant."

[49] ETH.MESH.00869908 (8/14/07 internal project chart).

[50] Hansen, B., et al., Long-Term Follow-up of Treatment for Synthetic Mesh Complications, Female Pelvic Med & Reconstr Surg 2014, 20:126-130; Barski D, et al., Systematic review and classification of complications after anterior, posterior, apical, and total vaginal mesh implantation for prolapse repair. Surg Technol Int. 2014, 24:217-24.; Shah, et. al., Mesh complications in female pelvic floor repair surgery and their management: A systematic review. Indian J Urol. 2012 Apr; 28(2):129-53; Feiner, B., et al., Vaginal Mesh Contraction: Definition, Clinical Presentation and Management, Obstet Gynecol 2010, 115:325-330; Morrisoe, S., et al., The use of mesh in vaginal prolapse repair: do the benefits justify the risks? Current Opinion in Urology 2010, 20:275-279; Blandon, et al., Complications from vaginally placed mesh in pelvic reconstructive surgery, Int Urogynecol J 2009, 20:523-31; Jacquetin, B, Complications of Vaginal Mesh: Our Experience, Int Urogyn J, 2009, 20:893-6.

[51] ETH.MESH.02282833 (10/07/04 email from Bell to Angelini).

[52] ETH.MESH.02282834 (10/07/04 email from Bell to Angelini).

[53] ETH.MESH.03920749 (04/14/05 email from Cheryl Bogardus to Ophelie Berthier. Bogardus states the TVM strategy includes "a commitment to tension-free, fixationless repair."

[54] ETH.MESH.03736452 (9/13/2005 Internal complaint memorandum).

[55] Id.

[56] ETH.MESH.02341522 (2005 – 2007 Prolift IFU); ETH.MESH.02341454 (2007 – 2009 IFU); ETH.MESH.02001398 (2009 – 2010 IFU); ETH.MESH.02341658 (2010 – Discontinuance IFU).

[57] ETH.MESH.07346252 (1/24/2006 internal presentation)-slide 12, "Tensioning of Mesh."

[58] Id.

[59] Id. Emphasis in original.

[60] ETH.MESH.01239423 (8/10/09 internal e-mail).

[61] Id.

[62] ETH.MESH.07171406 (9/3/09 internal e-mail).

[63] ETH.MESH.03932907 (1/16/07 internal memo).

[64] ETH.MESH.03920749 (04/14/05 email from Cheryl Bogardus to Axel Arnaud and others).

[65] ETH.MESH.00132907 (06/17/05 internal email from Allison London Brown).

[66] ETH.MESH.00757565 (6/28/06 internal email).